

[3.0064]

THE HOSTS OF *Neurocolpus nubilus* (Say),
THE CLOUDED PLANT BUG (Hemiptera, Miridae)¹

Richard L. Lipsey²

Introduction

Neurocolpus nubilus, the clouded plant bug, was described by Thomas Say in 1832, from a specimen collected in Indiana (LeConte, 1883). While Say placed it in the genus *Capsus*, Reuter, in 1876, used *N. nubilus* as the type species when he named the genus *Neurocolpus*. *Capsus hirsutulus* Britan is considered synonymous to *N. nubilus* (Distant, 1904), but distinct from *N. mexicanus* and *C. affinis* (Knight, 1934).

N. nubilus has been recorded from Canada to Panama and from Maine to California on button bush growing in eastern swamps to mesquite growing in the desert in the southwest (Van Duzee, 1889; Crawford, 1916; Knight, 1941; Needham, 1908). A list of 42 known hosts from the literature appears in Table 1. Bibby, 1946, reported *N. nubilus* caused economic damage in cotton in Mississippi, while Crawford, 1916, found apple damage by *N. nubilus*. This insect did more to lower yield in the cotton crop in Mississippi in 1946 than did any other insect pest (Bibby, 1946). *N. nubilus* has been reported to spread the twig blight, *Bacillus amylovorus*, to apples (Caesar, 1913).

Crawford wrote on certain aspects of the biology of the clouded plant in 1916. The life history is described in a paper in press.

N. nubilus was first collected in Arkansas in 1924, in Lee County. The Entomology Department Museum at the University of Arkansas contains a total of 26 specimens collected from seven counties during May, June, and July from 1924 to 1965. Recent specimens have been collected in August and September as well as the months mentioned above. Extension personnel

¹Accepted for publication September 24, 1970.

²Department of Entomology, University of Illinois, Urbana, IL 61801.

began finding *N. nubilus* in cotton in ever increasing numbers in northeast Arkansas from 1958, through 1966, with the peak appearing in 1965.

This study on the hosts of the clouded plant bug was done during the summers of 1966, and 1967, at the Northeast Branch Experiment Station in Keiser, Arkansas.

Table 1. A list of all hosts of *N. nubilus* found in the literature.

- | | |
|-----------------------------|-------------------------|
| 1. Alsike clover * | 22. Mesquite |
| 2. Apple * | 23. Mullein |
| 3. Alternate-leaved dogwood | 24. Old witch grass |
| 4. Burdock * | 25. Orange milkweed |
| 5. Button bush * | 26. Peach trees * |
| 6. Canadian blue grass | 27. Peppermint |
| 7. Catnip | 28. Pigweed |
| 8. Cone flower | 29. Poison sumac |
| 9. Cotton | 30. Ragweed |
| 10. Cottonwood | 31. Raspberry |
| 11. <i>Croton capitatus</i> | 32. Red clover |
| 12. Curled dock * | 33. Round-leaved mallow |
| 13. Elder * | 34. Rye * |
| 14. Evening primrose * | 35. Spearmint |
| 15. False indigo | 36. Spy apple * |
| 16. Golden rod | 37. Staghorn sumac |
| 17. Ground cherry * | 38. Stinking milkweed |
| 18. Hairy vetch | 39. Sumac * |
| 19. Horseweed | 40. Teasel |
| 20. Hungarian millet | 41. Timothy * |
| 21. Kentucky Coffee tree | 42. Willow |

*Designates those hosts on which nymphs were found also.

Materials and methods

Selected field crops and ditches in northeast Arkansas were sampled with 15 inch sweep nets and a D-Vac vacuum apparatus, from June to September, in 1966 and 1967. Techniques of sampling had to vary with the host plants sampled. For example, blooming button bush could not be swept without crushing the insects under a mass of buttons, and a D-Vac could not be carried into ditches where the vegetation was too thick. Also, valid compari-

sons could not be made between populations of *N. nubilus* on various host plants for the same reason, so we could not quantitatively determine which were the most important hosts. Also, since we could collect only during the summer, a complete seasonal history study was not possible.

One thousand sweeps were taken in cotton, soybeans, corn, wheat, and alfalfa fields during June and half of July in 1966, but this was reduced to 100 sweeps for the remainder of the summer. There were 16 cotton fields, 8 soybean fields, 3 alfalfa fields, 1 corn, and 2 wheat fields involved in the survey in 1966. The following summer the same fields were swept except that no corn or wheat fields were involved since no *N. nubilus* were collected from these two hosts in 1966. In 1967, only 100 sweeps were taken in each of the fields.

These fields were swept regularly, about every three weeks in 1966, and about every two weeks in 1967. But in 1967, 6 cotton, 6 soybean, and 3 alfalfa fields were swept weekly to determine population build-up in these three field crops. Ten sweeps were taken in 10 widely separated places in each field in an attempt to cover as much of each field as possible. The ditches were swept as frequently as the field crops, but the number of sweeps depended on the extent of a pure stand of a particular host.

The D-Vac was used in 1966 in all crops except wheat, in an attempt to suck the nymphs out of flowering parts. It was every Tuesday in the same 3 cotton fields, 3 soybean fields, and 1 alfalfa field. The funnel had a one-half square foot opening and was operated for one to five minute periods for an average of 157 row feet covered in one minute.

The host plants were identified by Drs. E. E. Dale and E. B. Smith of the Botany and Bacteriology Department of the University of Arkansas. The confirmation of the identification of *N. nubilus* was made by Dr. H. H. Knight of Iowa State University and Dr. J. L. Herring of the Entomological Research Division, Systematic Entomology Laboratory, Beltsville, Maryland.

Results

Adult and nymphal *N. nubilus* were collected from three field crops: cotton, soybeans, and alfalfa. None were found in corn or wheat, using a sweep net for a total of 3,600 sweeps in June, July, and August of 1966. In addition, this mirid was collected from a total of 13 wild hosts during 1966 and 1967 (Table 2). Ten of these wild plant species are previously unrecorded as hosts in addition to soybeans and alfalfa.

Nymphs were collected from: cotton, soybeans, alfalfa, button bush, black willow, smart weed, ladies' eardrop, and daisy fleabane.

Adults were first collected in early June on button bush, black willow, and

soybeans, and the last adults were collected in the last week of September on late blooming and fruiting hosts: cotton, golden rod, smart weed, stink weed, and wild pepper. Small isolated populations of the clouded plant bug were seen in cotton well up into October. The populations in cotton during both summers averaged 2.65 individuals per 100 sweeps. The population peaks occurred in August with a total of 187 bugs per 190 row feet.

In soybeans the populations were low during 1966 and 1967, but they were fairly consistent all summer long.

Button bush and black willow supported the highest populations. The peaks appeared in July when a total of 50 adults and 150 nymphs were counted on 21 button bush plants in 2½ hours, and 27 adults and 3 nymphs were collected in 400 sweeps. But more *N. nubilus* was taken from button bush during the two summers than from any other host. More nymphs were found in button bush than from all other hosts combined. Nymphs appeared on button bush with the appearance of flower buds or buttons in June. These numbers reached as high as 6 nymphs per button and 23 nymphs per plant in July at the peak. Nymphs were still present throughout August but in very low numbers. Black willow supported clouded plant bug populations throughout the summer, from the first week of June to the last week of August, but no nymphs were collected on this host after mid-July during either summer.

The other hosts supported low populations at particular times during the summer. Nymphs were found on the major hosts mentioned above, as well as smart weed, ladies' eardrop, and daisy fleabane only at the time of blooming.

Discussion

Neurocolpus nubilus is a polyphagous mirid. A total of 16 host plants were recorded in northeast Arkansas during the summers of 1966 and 1967. A literature search revealed 42 hosts for this insect, while this study found ten new hosts, for a total of 52 host plants. Six hosts had previously been recorded in the literature. The 16 hosts of *N. nubilus* in northeast Arkansas include 3 field crops: cotton, soybeans, and alfalfa, and 13 wild hosts mainly in wet ditches and at or near the time of blooming.

Adults were collected from 64% of all cotton fields sampled in 1967, and averaged 2.65 individuals per 100 sweeps. *N. nubilus* adults were first found in cotton about the time of squaring, the last week of June, and disappeared in October. We don't know if *N. nubilus* actually does damage in cotton until present experiments are concluded.

The most important hosts appear to be button bush and black willow since they supported the highest numbers. The peaks appeared in July at the

Table 2. Host plants of *Neurocolpus nubilus* in Mississippi County, Arkansas, with combined data from 1966 and 1967.

Hosts	Weeks:	June				July				August				September			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1. Alfalfa*					X												X
2. Black willow (<i>Salix niger</i>)*	X																X
3. Button bush (<i>Cephalanthus occidentalis</i>)	X																X
4. Cotton						X											
5. Daisy fleabane (<i>Erigeron</i> spp.)*													X				
6. Evening primrose (<i>Denathera biennis</i>)												X					
7. Golden rod (<i>Salidago altissima</i>)																X	
8. Honeysuckle (<i>Lonicera</i> sp.)*		X															
9. Johnson grass (<i>Sorghum halepense</i>)*		X															
10. Ladies' eardrop (<i>Brunniehia cirrhosa</i>)*									X								
11. Morning glory (<i>Ipomoea pandurata</i>)*											X						
12. River locust (<i>Amorpha fruticosa</i>)*		X										X					
13. Smart weed (<i>Polygonum pennsylvanicum</i>)*												X					
14. Soybean*		X												X			
15. Stink weed (<i>Pluchea camphorata</i>)*																	X
16. Wild pepper (<i>Ampelopsis arborea</i>)*							X										

*Previously unrecorded hosts

peak of reproduction for both hosts. In fact, I believe that there is a strong correlation between time of flowering of the various hosts and the presence of *N. nubilus*. The insect was found on all hosts when flower buds, blooms,

or fruit were present. It was collected on smart weed, golden rod and other later blooming hosts only when it was blooming in late August and early September.

Since nymphs were collected from 8 hosts, then *N. nubilus* can probably pass its life cycle on these hosts. They are: cotton, soybeans, alfalfa, button bush, black willow, smart weed, ladies' eardrop, and daisy fleabane. Previously recorded hosts, such as staghorn sumac, cottonwood, apple, and pigweed, which are common to northeast Arkansas were swept extensively, but no clouded plant bug was ever taken from these hosts.

I believe this insect over-winters in the egg stage from diapausing eggs laid in late August. About 30 eggs brought back to the laboratory at this time imbedded in the nodes of button bush failed to hatch. Also, in live button bush in the field, eggs stayed imbedded in the stems up until the time observations ceased in October and no nymphs were found on this host after the last week of August. Experiments in the laboratory where temperature, humidity, and especially photoperiod are controlled, I hope, will confirm this opinion.

Since it takes about 40 days to pass one generation in the laboratory (Lipsey, in preparation) and the first nymphs hatch in May, then from 2-3 generations may be possible in the field each summer in northeast Arkansas. Crawford (1916) also reported that nymphs first appeared on May 27 in an apple orchard in Ontario, Canada, and the population completely disappeared by September 7.

The wide distribution of this species, together with the large number of host plants, some of them field crops, make *Neurocolpus nubilus* an important species in North America. Bibby (1946) reported that it damaged cotton; Crawford (1916) found that it damaged spy apples. Since it occurs also in such crops as clover, vetch, millet, peaches, peppermint, spearmint, raspberries, rye, timothy, soybeans, and alfalfa, as well as in various economically important shade trees, *N. nubilus* could be of economic importance. It also has the capacity for producing high numbers of individuals. Therefore, research continues on the possibility that this plant bug may become an economic pest of cotton in northeast Arkansas.

Literature cited

- Bibby, F. F. 1946. *N. nubilus*, a cotton pest. J. Econ. Ent., 39(6): 815.
Caesar, L. 1913. Some new and unrecorded Ontario insect pests. Ent. Soc. Ontario Report no. 44, pp. 102-103.
Crawford, H. G. 1916. A capsid attacking apples (*N. nubilus*). Ann. Report Ent. Soc. Ontario, 46: 79-88.
Distant, W. L. 1904. Heteroptera. Ann. Mag. Nat. Hist., 7: 110-205.
Knight, H. H. 1934. *N. Reuter*: key with five new species, (Hemiptera, Miridae). Bull. Brooklyn Ent. Soc., 29: 162-167.

- Knight, H. H.** 1941. The plant bugs or Miridae of Illinois. Bull. Illinois Nat. Hist. Survey, 22, article 1.
- LeConte, J. L.** 1883. The complete writings of Thomas Say on the entomology of North America. 1: 341.
- Needham, J. G.** 1903. Button-bush insects. Psyche, 10: 22.
- Reuter, O. M.** 1876. Capsinae ex America Boreali in Museo Holmiensi asservatae, descriptae. Ofv. Sv. Vet.-Ark. Forh. 32(9): 59-92.
- Van Duzee, E. P.** 1917. Hemiptera of America north of Mexico. Vol. 2, Univ. California Pub. Ent., pp. 314-315.

2.0064. The hosts of *Neurocolpus nubilus* (Say), the clouded plant bug (Hemiptera, Miridae). Abstract.—*Neurocolpus nubilus*, the clouded plant bug, was collected from three field crops and 13 wild hosts during the summers of 1966 and 1967, in the north-east corner of Arkansas. Nymphs first appeared in May on button bush, black willow, and other wild hosts in ditches, with the adults appearing in June and moving into cotton, soybeans, and alfalfa. Two to three generations are possible and diapausing eggs are probably laid in August and September.—**Richard L. Lipsey**, Department of Entomology, University of Illinois, Urbana, IL 61801.

Descriptors.—Hemiptera; Miridae; *Neurocolpus nubilus*; clouded plant bug; Arkansas; hosts; season.